
Physical and psychosocial Impact of Cochlear Implantation on children

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Abstract

Objective: to evaluate physical and psychosocial states of children with severe to profound hearing loss before and after cochlear implant surgery.

Methods: This research was done on 34 children that had cochlear implants and their parents. Parents of participants answered the PedsQL questionnaire before and 6 months after full mapping of the CI device .

Results: There was a highly statistically significant difference between the pre-operative and post-operative CI physical and psycho-social scores .

Conclusion: The children showed better psychological life, social communication and physical activities after the CI use. So, this questionnaire should be used in CI centers to give important feedbacks.

Keywords: Cochlear implant, questionnaire.

Introduction

Hearing loss is a common disorder among children all over the world. The incidence of neonatal hearing loss in the US in a recent review was 1.1 per 1000 infants. Hearing impairment has many impacts on the children it leads to speech and language deficits, learning and communication problems ^{1, 2}.

Communication problems lead to emotional and social disadvantages. Children with untreated hearing loss complaint from isolation and sadness in school with inability to effectively communicate and socialize with their peers, which have a detrimental impact on the child's vocational choices ³.

Cochlear implant (CI) is one of the management tools for hearing loss, it is a hearing device that is designed to bypass the damaged parts of the inner ear by electrically stimulating the auditory nerve. The benefits of CI for the children with severe and/or profound hearing loss extend to beyond the improvement in hearing and language skills, and in speech production and perception. This benefit also involves other aspects of the child's daily life, such as physical, psychological and social well-being ⁴.

Communication means to participate and perform activities and consequently, it is directly related to socialization, as social interactions

occur by verbal communication. The social issue is one of the most important parts of the child's development; it integrates the meaning of quality of life, functionality, physical and mental well-being. Therefore, the development of language through the CI use will improve the development of communication skills, which can lead to improvement in the quality of life. ⁵

The rationale of our study is to evaluate physical and psychosocial states of children with severe to profound hearing loss before and after cochlear implant surgery.

Patients and Methods:

This study was done at Sohag university hospital (Cochlear implant center) from March 2016 to February 2018.

Patients:

The study sample consisted of 34 children that had cochlear implants and their parents.

Inclusion criteria were as follow: 1- Participants should be children (aged from 4 to 8 years). 2- Children should be free from any medical problems or concomitant factors, such as visual impairment or compromised motor development. The selected children were divided into two groups: Group I included pre-school children and group II included school children.

Methods:

Parents of participants answered the PedsQL questionnaire before and after cochlear implant surgery .

The PedsQL questionnaire: the generic core scale measures health-related quality of life (HRQOL) in healthy children and adolescents. It contains four multidimensional scales including physical, emotional, social, and school functioning, yielding summary scores in physical and psychosocial health as well as a total

score. The PedsQL™ 4.0 Generic Core Scales consists of parallel child self-report and parent proxy-report formats. Child self-report includes ages from 5 to 7 and 8 to 12 years. Parent proxy-report includes ages 2 to 4 (toddler), 5 to 7 (young child) and 8 to 12 (child) and assesses parent's perceptions of their child's HRQOL. We used the parent proxy – report format from age 2-12 years old to assess the health-related quality of life (1&2). It is a 5 likert scale ranges from 0-5 and then the items are reverse-scored and linearly transformed to a 0–100 scale (0 = 100, 1 = 75, 2 = 50, 3 = 25, 4 = 0), so that the higher scores indicate better HRQOL. And then calculate the mean score. ⁶⁻⁸ We used the Arabic version (4). ⁸

The questionnaire was answered by the parents twice, one before the CI operation during the process of the child's preparation to the CI surgery and the other time was applied six months after full mapping of the CI device.

Ethical issues

The study and the free informed consent form were approved by the institutional review board. All parents voluntarily signed the free informed consent form after agreeing to participate in the study.

Data collection and Statistical analysis:

Questionnaires were mainly distributed and collected in face-to-face interviews in the implantation center. The questionnaires filled out by the parent. The questionnaires were filled out individually after explanations given to parents.

Results:

Over a two years period, 34 children were included in this study with an age range from 4 to 8 years with a mean of 5.85 years. They were 18 girls (52.94 %) and 16 boys (47.06 %).

As regards the device usage, the time

since implantation was less than 12 months for 30 children (88.24%), whereas this was more than 12 months in 4 children (11.76). Twenty-eight children (82.36 %) used their device for more than 14h/day. All children received language and speech therapy sessions. Fifteen children (44.12 %) attended kindergartens and eight children (23.53%) attended primary school.

On the physical subscale, 79.41 % of parents stated that there was an improvement in their children physical activity and their sharing in playing or little home duties.

On the psychological subscale 88.24 % of parents stated that there was an improvement in the confidence of their children. Also, they stated that their children became independent to a similar degree to most of their fellows. Twenty-eight parents (82.35%) stated that their children became calmer after implantation.

On the social subscale, 85.29 % of parents concluded that their children became more sociable in familial relations, and they could make friends more easily with non-family members.

On the educational subscale, 88.24% of parents stated that their children became more attended in the class with decrease the degree of absenteeism and they became more self-confident.

The children were divided into two groups; group I included pre-school children that were 14 children (41.18 %) and group II included school children that were 20 children (58.28 %).

Discussion :

The impact of cochlear implantation on the children with severe and/or profound hearing loss extends to beyond the improvement in hearing and language skills, and in speech production and perception. This impact also involves other aspects of the child's daily life, such as physical,

psychological and social well-being⁴.

Thoutenhoofd et al., 2005⁹ and Frank and John, 2006¹⁰ concluded that studies on the quality of life have variable parameters such as age at implantation and duration of the cochlear implant that make these studies more heterogeneous, which was described as a disadvantage in obtaining objective results. They reported that studies done among children with similar cochlear implant durations and age at implantation may give more effective results. So, in our study the selected children had similar implant duration and nearly the same age at implantation.

In this study, physical activities, social communication, psychological health and education were improved significantly after cochlear implantation (table 1). This agrees with study done by Huttunen et al., 2009¹¹, who applied a questionnaire to 36 families, whose children underwent the operation at 2 years of age after a recovery period of 2–3 years. He stated that the most satisfying results were improvements in social relations, communication, speaking and general functional improvements.

Edwards et al., 2012¹² prepared a questionnaire that consisted of 22 questions and applied this questionnaire to parents of children with cochlear implants. They reported that cochlear implantation had a positive effect on the quality of life, communication abilities, and freedom.¹³ Also reported that cochlear implantation had a positive effect on the quality of life by presenting a questionnaire to 10 parents of patients.

In our study, children with cochlear implants were subdivided into pre-school (ages 2–6 years) and school (ages 6–8 years) groups. Social and psychological scales were statistically significantly higher in older children (table 2). This can be explained by that the maturation of the psychological behavior with age can be significantly

improve with the help of CI.

Calderon, 2000¹⁴ Emphasized that the most important factor in the follow-up and control of children by healthcare providers was their family. So, the expectations of families should be evaluated effectively.

Conclusions:

At the end of the work, the children showed better psychological life, social communication and physical activities after the CI use. The positive effect of CI on the children quality of life is a fact, but parents have concerns at the preoperative and postoperative periods. As a result, this questionnaire should be used in cochlear implantation centers and might give important feedbacks for these centers.

Score	Mean		SD		P Value
	<i>Pre-implant</i>	<i>Post-implant</i>	<i>Pre-implant</i>	<i>Post-implant</i>	
Physical score	15.49	92.095	4.47	9.920	< .00001
Psycho-social score	6.37	89.51	2.05	11.54	< .00001
Total score	11.67	91.61	3.51	8.34	< .00001

Table (1) The mean & SD for physical, psycho-social and total scores for children pre and post implant. There were high statistically significant differences between the scores in pre and post implant conditions.

Score	Mean		SD		P Value
	<i>Group I</i>	<i>Group II</i>	<i>Group I</i>	<i>Group II</i>	
Physical score	78.4	91.56	6.34	9.81	< .00001
Psycho-social score	66.51	93.40	8.76	12.34	< .00001
Total score	74.56	92.58	6.11	9.98	< .00001

Table (2) The mean & SD for physical, psycho-social and total scores in the post implantation condition between the 2 groups. There were high statistically significant differences between the post-implantation scores in the 2 groups.

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